Final Exam Test Prep

1. What is the molarity of 34.87 grams of Rhenium? (Molar mass of Rhenium: 186.207 g/mol)

2. What is the molality of a solution of 1.25 moles of sugar dissolved in 0.750 kg of water? What is the boiling point and freezing point of the resulting solution?

3. Find the new freezing point of a solution that has 58.44 g of NaCl in 1.00 kg of H_2O ($K_f = 1.86$ C/m).

4. For the reaction $2A + B \rightarrow AB$ the following data was observed:

Trial	Initial [A]	Initial [B]	Initial Rate
1	0.480 M	0.190 M	0.350
2	0.480 M	0.380 M	0.350
3	0.240 M	0.190 M	0.087

A) Determine the order of each reactant:

B) Determine the overall order of the reaction:

C) Write the rate law:

D) Calculate the value for k:

5. What is the pH of $Be(OH)_2$ if $[H^+] = 0.28$ M?

6. A 0.175 M weak acid solution has a pH of 3.25. Find K_a for the acid:

7. Calculate the pH of a 0.20 M solution of ammonia. K_b of NH_3 is 1.8×10^{-5}.

$$NH_3\ (aq) + H_2O\ (l) \leftrightarrows OH^-\ (aq) + NH_4^+\ (aq)$$

8. Calculate the pH of a buffer composed of 0.10 M acetic acid (CH_3COOH) and 0.60 M (CH_3COO^-) knowing that the acid dissociation constant is 1.8×10^{-5}.

9. Estimate the molar solubility of CaF_2 at 25 C in 0.010 M $Ca(NO_3)_2$ solution.

10. If the standard enthalpy of a reaction is -128.13 kJ and its standard entropy is -332.5 J/K. What is the change in Gibbs free energy? Is the reaction spontaneous?

11. For the reaction

$$SO_2\ (g) + 2H_2S\ (g) \rightarrow 3S\ (s) + 2H_2O\ (g)$$

	▲H	▲S
SO_2	-296.8	0.2481
H_2S	-20.6	0.2057
S	0.0	0.0318
H_2O	-241.8	0.1887

a) Calculate ▲G:

b) Is this reaction spontaneous?

12. Calculate the standard cell potential for the following reaction:

$$Ag^+ + Tl \rightarrow Tl^+ + Ag$$

$Ag^+ + e^- \rightarrow Ag$ + 0.80 V
$Tl^+ + e^- \rightarrow Tl$ -0.34 V

13. Balance the following redox reaction:

$$BrO_3^- + Zn \rightarrow Br^- + Zn^{2+}$$

14. Balance the following reaction:

$$Al + ClO^- \rightarrow Al^{3+} + Cl^-$$

15. Complete and identify the following reactions:

$_{48}^{112}Cd \rightarrow _{46}^{108}Pd +$

$_{71}^{175}Lu + \quad \rightarrow _{70}^{175}Yb$

$_{62}^{150}Sm \rightarrow _{61}^{150}Pm +$

16. What would you call a carbon compound with only single bonds between carbons? What bond angles do these compounds have?

17. What would you call a carbon compound with double bonds? What bond angles do these compounds have?

18. What would you call a carbon compound with triple bonds? What bond angles do these compounds have?